



**ENVIRONMENTAL
PRODUCTS, LLC™**

**LSC Environmental Products, LLC
2183 Pennsylvania Avenue
Apalachin, NY 13732**

June 16, 2017

Presentation for

**Oklahoma
Engineering
Conference**

We are glad to be here today

Innovative Hydraulic Matrices: Expanded BMP's Using Standard Equipment

Solutions for the Greener Good



Connect with us:



Extensive experience

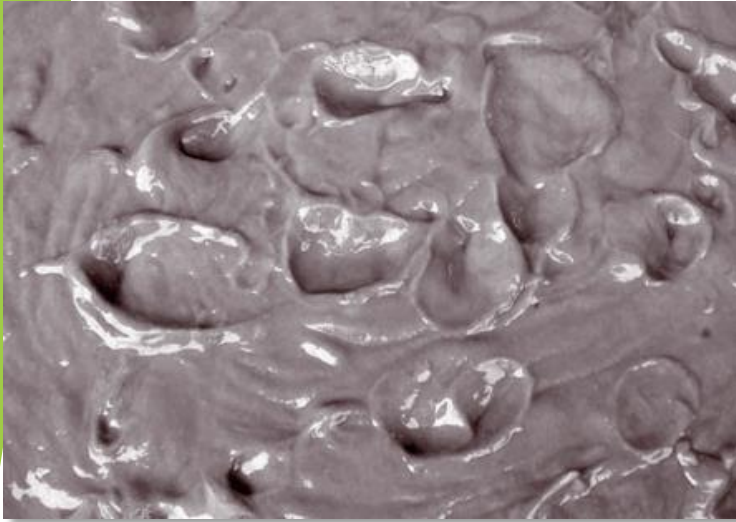
- 27+ Years experience
- 100's of customers, clients, and contractors
- In over 40 states domestically and in Canada



HMM (Hydraulically-applied Mineral Matrix)

- ▶ Specifications by LSC Environmental
 - ▶ www.lscenv.com
- ▶ Patented unique solution
- ▶ Currently nothing like it on the market

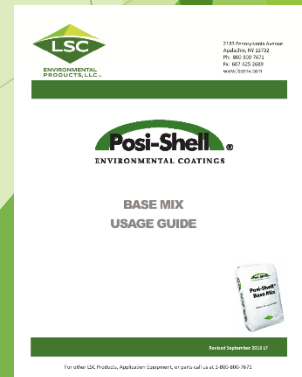
What is Hydraulic Mineral Matrix



Posi-Shell + Durability Enhancer Slurry

Posi-Shell + Durability Enhancer cured

- High swell bentonite-based, enhanced mineral material combined in field with Pozzolonic durability enhancer
- Small particulate material creates smooth viscous slurry
- Looks like Tapioca Pudding.... Except its edible.
- Used in the Solid Waste market since 27 year inception



Applications

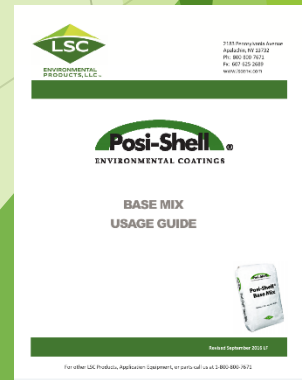


**Hong Kong
Application**



One year later

Proven on 90+ inches of rain in North Carolina!!



Application: 7 acre Temporary Impermeable surface

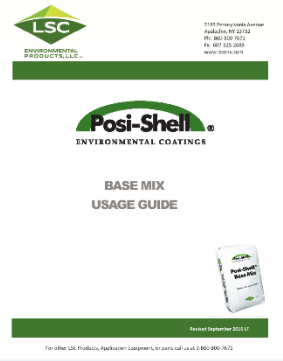


Applications- Coal Ash facility.



Applications

Application on a raw resource pile in New York State.



Applications



Line Ditches



Stabilize Slopes



**Cover clean or
contaminated
Piles**



Storm Protection



Mechanically Pulverized



Used in several high profile environmental disasters

- 9-11 World Trade Center Debris Cleanup
- Wildfires
- Landfill Fires
- Hazardous Waste
- Landfill Landslides



Review of Posi-Shell® Usage Guide



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BASE MIX USAGE GUIDE



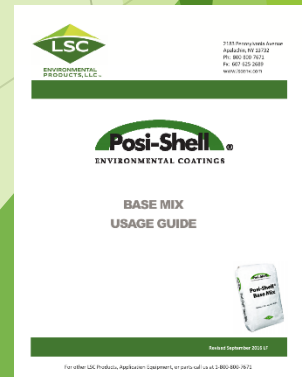
Revised September 2016 LF

For other LSC Products, Application Equipment, or parts call us at 1-800-800-7671



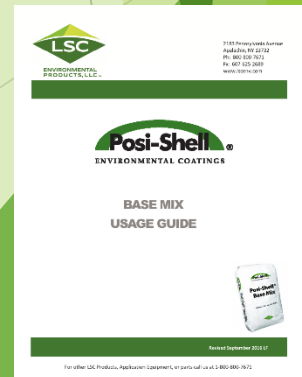
Safety- Quality Control

- LSC Certification Program – All first time users
- May include physical LSC presence on jobsite
- Full access to equipment parts, service, and customer service lines
- Simple and Easy technology to learn – similar to Standard Hydroseeding



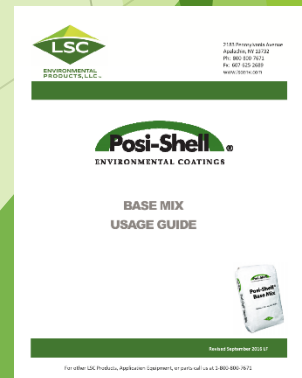
Loading and mixing

- Mix and Application sheets are provided to all First time users
- 27+ years of experience mixing and spraying tells us **YOU HAVE NO CONCERNS** with equipment
- Field Customizability. Longer performance needed- there's a formula...
- Unique Sequence loading is major difference vs. standard hydroseeding blends.
- No seed or fertilizer needed.



Cleaning

- 27+ years of experience mixing and spraying tells us YOU HAVE NO CONCERNS with equipment
- Cleans with Water
- Must clean equipment each operating day
- Standard fleet maintenance recommended by any equipment Manufacturer is usually sufficient



Cost Considerations

Provided for Context only. Cost varies for each project and can be a factor of size, location, performance desired, environmental and site conditions, etc.

Work with your local Representative for best results.

Product Formula	Duration (Months)	Typical Material Cost (/acre)	Typical Material Cost /yd ²
EC-1	1-3	\$2,216	\$0.46
EC-2	4-6	\$3,509	\$0.73
EC-4	*12+	\$6,485	\$1.36



*5-20% annual maintenance for manufacturer installed quality.

HBSA (Hydraulic Biotic Soil Amendment)

- ▶ Category by ECTC (Erosion Control Technology Council)
 - ▶ www.ectc.org
 - ▶ Specifications for use and consideration
- ▶ Numerous products on the market representing most major manufacturers

Soil transformation medium

- **What is It?**

- Hydraulic Biotic Soil Amendment (HBSA)
- Organically derived materials
- Growth Stimulators
- Micro Organisms
- Erosion Control
- Organic Fertilizer

- **Effective For:**

- Establishing growth when topsoil is depleted
- *EarthGuard Organix* for flat areas
- *EarthGuard Fusion* for slopes

HBSA



FUSION™



FUSION does what Mother Nature does... ONLY FASTER!

- ▶ Growth mediums provide immediate material for vegetation establishment
- ▶ Adds exactly what is needed to develop topsoil for plant sustainability
- ▶ Supports microorganisms in the soil
- ▶ Provides exceptional erosion control immediately after application to ensure seed, growth mediums and soil stay in place
- ▶ Industry's only 1-step solution to organic inoculation



Available HBSA's on Market

Comparison of topsoil developing features of commonly used hydraulic biotic soil amendments

	Organix™	Proganics™	Biotic Earth™	Topsoil	PermaMatrix®	Compost	Fusion™
Beneficial Microbes – Essential for a soil to remain alive and vital. Improves nitrogen fixation, soil structure, and maintenance of nutrients.	●			●	●	●	●
Microbial and Plant Growth Stimulators – Improves plant cell division, photosynthesis, and nutrient use which creates healthy and robust plants.	●	●	●	●	●	●	●
Peat – Increases water retention of soil and releases humic and fulvic acid. Well known stable growth medium.	●		●				●
U.S. Composting Council Certified Compost – A growth medium for nutrient maintenance. Food source for microbes. Helps to build soil structure/aggregates. Releases humic and fulvic acids, other essential amino acids and vitamins.	●					●	●
Mycorrhizae – Creates healthier and more robust plants through improved root development.	●	●	●		●		●
Thermally Processed Wheat Straw – Efficient soil cover regulating heat and moisture at the surface. Provides carbon, organic material and a microbial energy source that easily degrades. Does not lock up nutrients (like wood fibers.)	●		●				●
Long-term Interlocking Fiber – Holds all other fibers together and provides microbial energy source for up to 2 years.	●	●	●				●
Organic Hydrocolloidal Tackifier – Provides initial energy source for microbes while sticking all materials together and to the soil.	●	●					●
Chemistry For Soil Structure – Rapidly develops and preserves existing soil structure and pore space which allows for proper infiltration while reducing soil crusting and soil loss.	●						●
Erosion Control – NO additional erosion control treatment needed.							●

But Why should I spend more on my Hydroseeding???

- ▶ Scientific Approach- Structures vs. revegetation
- ▶ NOT's not NOV's
- ▶ Agricultural Industry has already plowed the way
- ▶ Not necessarily more expensive



Pull Soil Samples.. PLEASE!

- ▶ Pull Composite Samples from top 6 inches.
- ▶ Make, buy, or steal soil probes
- ▶ Agricultural Sector will pull 1 every 200 linear feet!
 - ▶ Start with 1 every 1000 feet or maybe even 1 per project....
 - ▶ Target color changes and slope changes
- ▶ Need more specifications requiring soil testing

▶ Spend \$20/sample on the tests you need.



\$20 sample!

Ridiculous
results

Analysis	Units	Level Found	Rating
Organic Matter	%	0.4	Very Low
Nitrogen			
Surface Nitrate	lbs	0	
Sub Nitrate	lbs	0	
Total Nitrate	lbs	0	
Surface Nitrate	ppm	0	
Sub Nitrate	ppm	0	
Phosphorus			
Bray P1	ppm	10	Low
Olsen	ppm		
Potassium			
Ammonium Acetate	ppm	0	Low
Calcium			
Ammonium Acetate	ppm	68	Very Low
Magnesium	ppm	37	Low
Zinc	ppm	0.2	Very Low
Manganese	ppm	0	Very Low
Iron	ppm	0	Very Low
Aluminum	ppm		
Copper	ppm	0.1	Very Low
Boron	ppm		
Sulfur	ppm		
Sodium	ppm	32	Low
Chloride	ppm	31	Medium
Soluble Salts		0.03	
Subsoil Soluble Salts			
Excess Lime Rate			
pH		3.9	
Subsoil pH			
Buffer pH		7.2	
CEC	meq/100g	0.8	



Next Step: Agronomists

- ▶ Did you know that LSC and most of our competition with either cover analysis costs for batch sampling or assist with recommendations?
- ▶ Work with Manufacturers and 3rd party agronomists for rate recommendations
- ▶ Site-Specific recommendations. Know what your working with before investing
- ▶ Quality approaches take more time build in the extra 2 weeks upfront



Organic Inoculation

- ▶ Agricultural background, says: 100 years to make 1 inch of topsoil
- ▶ Incorporating organics in ideal conditions has shown results indicating 1 inch of Topsoil can be made in 1 year
- ▶ HBSA's work by supplementing, enhancing, and feeding the Microbial biome already in existence
- ▶ Reduce or even eliminate Topsoil needs

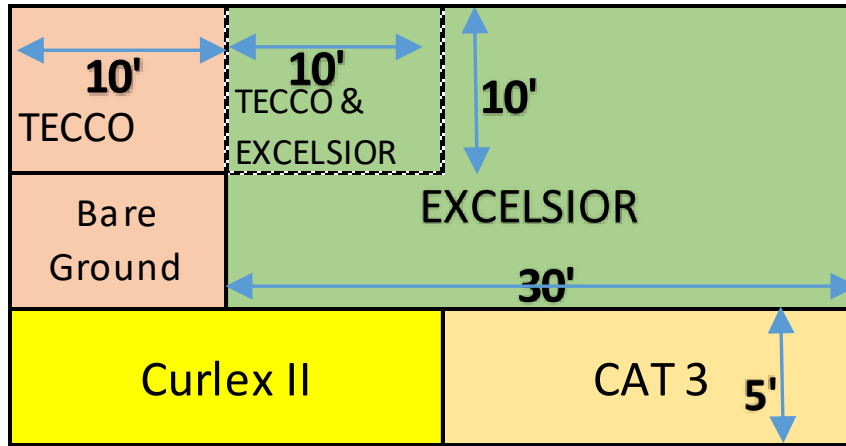


Case Study: HWY 210

- ▶ Motivated Contractor- Steep slopes, low accessibility, poor soils, past site failures.
- ▶ Challenges often require innovation. Very innovative and thorough design/build team.
- ▶ Ended up evaluating 13 test panels after giving call out to any manufacturer who thought their products could meet the challenge.
- ▶ Had to prove technology on their site and under their evaluation. Scored performance by walk through with 3rd party officials and team



Case Study: HWY 210: Duluth, MN



- VIET innovation

Example Test Panel

- 100% integrated and sprayed over by hydraulically applied materials as well as compost
- Additional panels included additional TRM's, brands, approaches, installation methods, etc.
- Judged on by: Cost, Ease of Application, and Performance
- Each Manufacturer installed their own panels, under state and Hwy 210 team oversight as well as competitive oversight

Case Study: HWY 210

- ▶ LSC's 1-step technology outperformed all panels, including compost.
- ▶ Material to be integrated either through or before TRM installed with 1 application pass
- ▶ Site has very challenging and slow growth seed varieties and tons of attention is continually given toward ensuring site success
- ▶ Numerous manufacturer site visits, design meetings, and performance checks as well as continued soil monitors and sampling



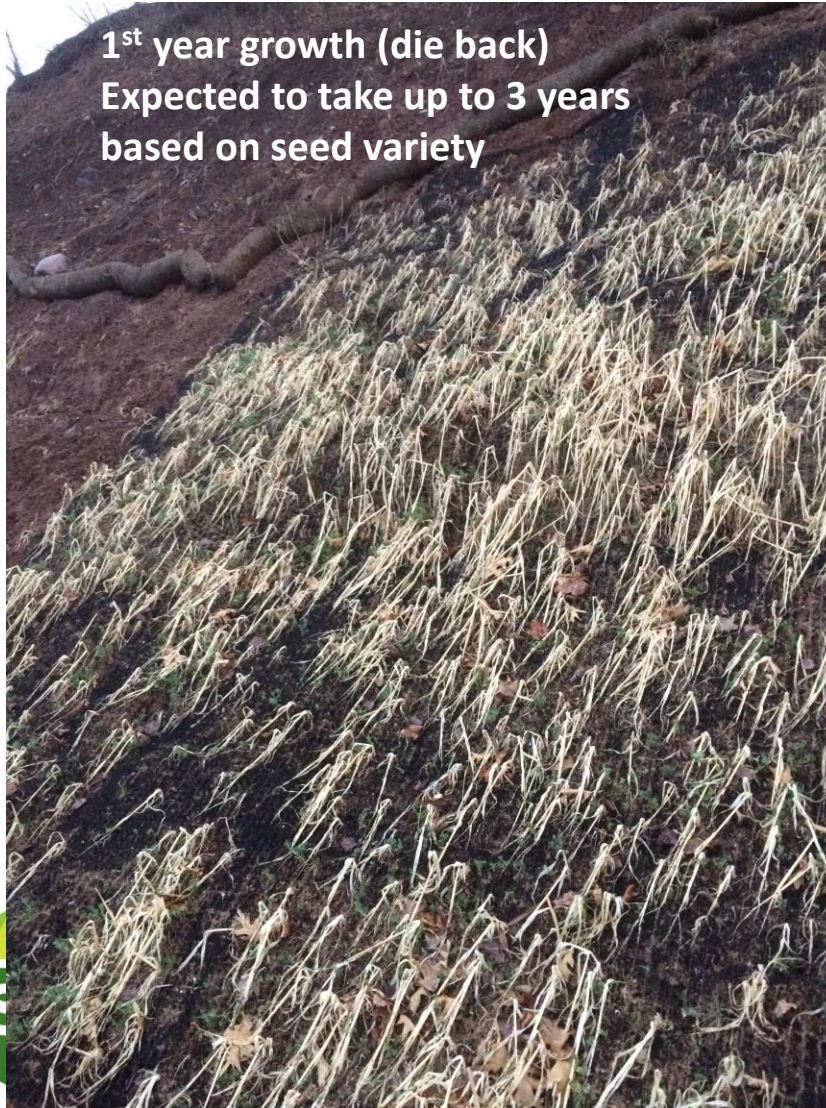
Case Study: HWY 210 Project Photos



Case Study: HWY 210 Project Photos



Case Study: HWY 210 Project Photos



1st year growth (die back)
Expected to take up to 3 years
based on seed variety



Product in suspension

Case Study: Energy Company Well Pad



Lined and Graveled area

Case Study: Energy Company Well Pad



Lined and Graveled area

Case Study: Energy Company Well Pad



Lined and Graveled area

Thank You.

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Solutions for the Greener Good



Connect with us:

